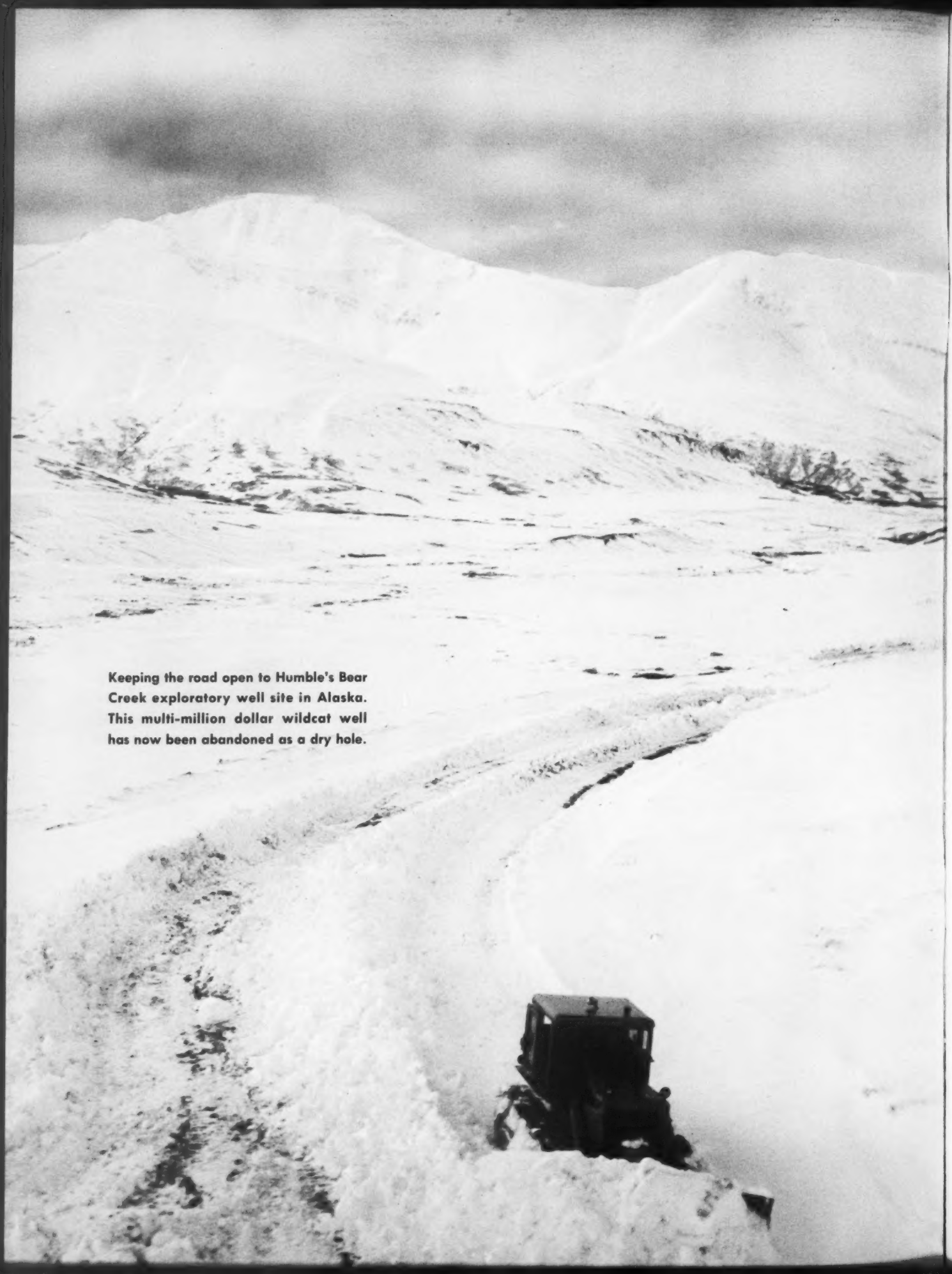
Louisiana Pine Plantation — *Lloyd Hawthorne*

The Humble Way

MARCH-APRIL, 1959



Keeping the road open to Humble's Bear Creek exploratory well site in Alaska. This multi-million dollar wildcat well has now been abandoned as a dry hole.

The Humble Way
March-April, 1959
Vol. XIV No. 6

DOMESTIC PETROLEUM EXPLORATION

. . . *achievements and prospects*

By Morgan J. Davis, *President*

ON SATURDAY afternoon, August 27, 1859, a momentous event took place in a small wooded valley near Titusville, Pennsylvania. The completion of America's first commercial oil well on that day marked the birth of a great new industry. It opened up a new source of energy. At the time, however, no one dreamed that oil would come to play such a vital role in our economy or that it would eventually displace coal as the nation's leading fuel.

This year—the centennial of Colonel Drake's discovery well—seems an appropriate time for trying to bring the industry's past and future into better focus. To do this, we must review the exploration achievements of the past century and consider the prospects for the years ahead.

As we look back, two salient points loom especially large. First, tremendous changes have taken place in the technology and operations of this dynamic industry. Second, there has alway been a consistent tendency, even by the industry itself, to underestimate its future growth, reserves, and prospects. Most of the efforts to forecast the industry's future have fallen woefully short, and there is reason to believe that many current estimates will prove to be no better.

Pessimistic views about the future of the domestic petroleum industry are almost as old as the industry itself. In 1885, the United States Geological Survey reported that in the opinion of Whitney and other eminent geologists no deposits of petroleum such as those developed in Pennsylvania would be found in California. In 1891, the Survey expressed a dim view as to future production in Kansas and Texas and went on to predict that the well-known regions of Pennsylvania, New York, West Virginia, Ohio, Southern California, and the Florence District of Colorado would continue to be the chief petroleum producing districts, with Wyoming another possibility. In 1908, Dr. David T. Day, a prominent petroleum specialist, estimated the ultimate oil production of the United States at a maximum of 15 to 22.5 billion barrels. In 1920, the Director of the Survey, George Otis Smith, was impressed by the

Delivered before the 44th annual meeting of the American Association of Petroleum Geologists, Dallas, Texas, March 17, 1959.

mounting tide of oil production but concluded that "the crest of this flood of oil must surely soon be reached." Toward the end of World War II, Secretary of Interior Harold L. Ickes, at that time Petroleum Administrator for War, wrote an article entitled "We Are Running Out of Oil" for a national magazine. In 1948, even such an eminent geologist as Everette DeGolyer expressed the pessimistic view that ultimate production in the United States would be only about 100 billion barrels.

Time has proved the fallacy of these predictions. This is more a warning as to the risks of forecasting the future of petroleum than a reflection on the ability of those who made the forecasts. The pessimists about domestic petroleum supplies have made their major error in the past in assuming that both current conditions and current technology would continue indefinitely into the future. A review of the record may help to show why such assumptions have been unwarranted.

The record of achievement

In reviewing the achievements of the past, it is convenient to divide the first century into 33-year periods representing three "generations" of petroleum exploration. (See Chart I).

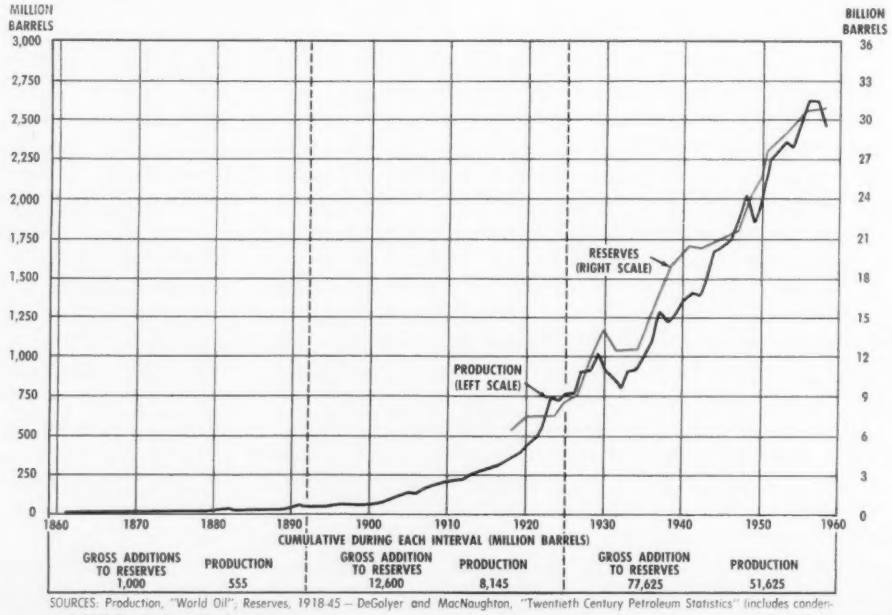
The first generation of the search for oil has been aptly decribed as the age of "creekology." For many years after the Drake discovery on Oil Creek, most wildcat drilling was guided by seeps, trends, wiggle sticks, and hunches. Chance played the leading role in discovery. Fortunately, the needs of the times were limited, since oil was used principally for illumination and lubrication.

Toward the end of this period, theories were formulated as to the geologic conditions favorable to the accumulation of oil. In 1885, I. C. White published a paper on the anticlinal theory and, after 1892, devoted his entire attention to petroleum. Science thus gained one of its first representatives in the industry. Up to that time, only 555 million barrels had been produced, and cumulative discoveries were probably not much more than a billion barrels.

In the "Middle Ages" of petroleum, or the second "generation" from 1892 to 1925, the search for oil was characterized by a gradual change from empirical to scientific methods and by the geographic extension of production to new areas, particularly to the Southwest. Early in this period, the old oil country—Pennsylvania, Ohio, and West Virginia—had ceased to be the heart of the petroleum intry.

(Chart I)

THREE "GENERATIONS" OF THE DOMESTIC PETROLEUM INDUSTRY 1859 - 1958



SOURCES. Production, "World Oil", Reserves, 1918-45 – DeGolyer and MacNaughton, "Twentieth Century Petroleum Statistics" (includes condensate), 1946-58 – American Petroleum Institute.

Concern about future domestic oil supplies must have been great at the turn of the century. The price of crude oil had advanced from 51 cents in 1892 to $1.19 in 1900, known producing areas were declining, and the demand for petroleum products was increasing rapidly. The end of an era of abundant and reasonably priced oil must have seemed inevitable to well-informed people as the year 1900 drew to a close. This was truly the end of an era, but not in the way then imagined.

On January 10, 1901, the well the Hamill brothers had been drilling laboriously for Captain Lucas at Spindletop reached a depth of 1020 feet and blew out as a gusher. This discovery immediately focused attention on similar surface indications of domes along the flat Gulf Coast plains, and soon there were other new fields in Texas and Louisiana. California found new production, and Oklahoma and Kansas developed substantial supplies after years of negligible output. Within a few years, oil production in the United States had doubled.

By 1908, geology was being systematically applied to petroleum exploration by an increasing number of trained men. Well-known geologists who cast their lots early with the new industry included E. T. Dumble, Alexander Deussen, F. G. Clapp, W. T. Griswold, I. C. White, Ralph Arnold, and A. Beeby Thompson. In 1917, the Southwestern Association of Petroleum Geologists was formed in Tulsa with 122 members. Out of this developed in 1918 the American Association of Petroleum Geologists with its present membership of 15,000.

World War I first made the United States conscious of the importance of oil for national security as well as for economic progress. Domestic production passed a million barrels daily in 1918, and the Allies, with abundant supplies of fuel for their ships, automotive equipment, and early aircraft, "floated to victory" on Lord Curzon's "sea of oil." Congress became aware of the problems involved in making reasonable allowance for the depletion of oil under the new income tax laws and wisely established the principles which are the basis of percentage depletion now.

Motor vehicles multiplied at an incredible rate, increasing from 2.5 million in 1915 to 20 million by 1925. In the general inflation following the war the price of crude oil soared to $3.07 in 1920, and then dropped abruptly to $1.73 in 1921. The number of wells drilled in the United States reached a peak of about 34,000 in 1920, a figure not to be surpassed for more than a quarter of a century.

The search for oil was carried to many new areas during the 1920's, including the Permian Basin of West Texas and New Mexico. This was the period of colorful and boisterous boom towns such as Ranger, Borger, Wink, Burbank, and El Dorado that sprang up near the great discoveries.

The search for oil was also being carried deeper. In 1925, additional sands were located at Spindletop, at a depth of 2588 feet, a dramatic example of how long it took to improve methods sufficiently to bring into commercial importance several thousand additional feet of sedimentary rocks. The drill was probing deeper into the earth, but the average depth of wells drilled in 1925 was still less than 3000 feet.

A period of progress

As the industry approached its 66th anniversary that year, it could look back with considerable pride on the results of its second generation of oil finding. Geologists had found oil in many areas that, only a few years earlier, had been considered unfavorable. Surface and subsurface geology, paleontology, and other scientific methods, such as the new tool, geophysics, were successfully applied to map prospective structures. Above all, the search had indicated that petroleum is a common constituent of sedimentary rocks as described so well by Wallace Pratt some years later.

The achievements of the years 1892-1925 were remarkable in terms of physical results as well as accumulated knowledge. By 1925, production had reached 2 million barrels daily and cumulative production had increased to nearly 9 billion barrels. Proved reserves were finally beginning to be given a good deal of attention and were generally estimated in 1925 to be about 4.5 billion barrels. Of the cumulative discoveries to that time, 90 per cent had been located during the last half of the period.

The success of the industry in finding new fields and in steadily raising production did not dispel the fears of the pessimists. Instead they worried lest every discovery hastened the days of scarcity and exhaustion. The President appointed a Federal Petroleum Conservation Board in 1924. Naval petroleum reserves were created in order to set aside oil for military purposes, and the industry became involved in an extensive debate about future prospects and conservation. Even as these discussions took place, the inexorable march of science was proceeding with developments that were presently to drown the fears of that time in a flood of oil.

And so we come to the third and present generation of petroleum exploration and development—the period 1926-1959.

Several important developments stand out in the application of science to petroleum since 1926: (1) Continued improvement of methods and skills in mapping underground formations and locating traps suitable for petroleum accumulations; (2) The improvement of drilling and testing methods so that both deeper and thinner formations became commercially feasible sources of petroleum; (3) The full flowering of reservoir engineering resulting in more efficient development of fields and recovery of a much higher percentage of the oil in place than had been possible before. In combination, these significant advances brought

forth an increasing number of discoveries that turned the third generation of petroleum exploration into a golden age.

With the addition of geophysics to geology, the search for oil was applied again to old areas, and to many new ones, with remarkable success. Major discoveries came so fast that an urgent new problem was created; namely, how to control production in order to avoid the waste of unrestricted flow and to realize higher recovery of oil in place. It was becoming increasingly apparent that close spacing of wells and the wide-open flow customary in new fields were incredibly wasteful. A series of major discoveries in Oklahoma and Texas, particularly the great East Texas field in 1930, brought these issues to a head. The result was legislation in most producing states to regulate the drilling of wells and the rate of production in order to achieve effective conservation of petroleum resources. The process took many years, but by 1940 the pattern was reasonably well established.

Benefits of conservation

Many benefits have resulted from conservation. Perhaps the most important was the ability of the domestic industry to increase production by a million barrels daily during World War II, and to sustain that high rate even with a restricted rate of drilling. Another advantage was in the development of more than four times as much reserves of oil and gas per well after rules of conservation and reasonable well spacing began to be applied effectively. Improved technology and more scientific methods had a great deal to do with these results, but sound conservation practices also played a significant part.

It is not necessary to discuss here the nature of many of the scientific advances in petroleum exploration, drilling, and production during the past 33 years. A few points are worthy of mention, however. First, the rate of oil finding has increased as more scientific effort has been devoted to exploration. In the past 10 years, gross additions to petroleum reserves have been in excess of 35 billion barrels, or nearly twice the rate indicated by the reserve estimates for the period 1926-1935. Second, technology has added many additional cubic miles of sediments to those still to be explored thoroughly. It was 1931 before a well was drilled to 10,000 feet, a depth now regarded as commonplace in many areas. Last year, for the first time, a well reached 25,000 feet, thus extending the potential petroleum horizons deeper into the earth. Technological improvements are still actively taking place in exploration, drilling, production, and reservoir management.

At the end of this year, when the industry comes to the close of its first century, it will probably report estimated proved reserves of more than 37 billion barrels of petroleum liquids and 260 trillion cubic feet of natural gas, the largest quantities in its history. Large as they are, they may still be understated, since estimates of the Reserves Committee of the American Petroleum Institute on proved crude oil reserves have seemed in recent years to be increasingly conservative by comparison with other reputable sources of reserve information. The "lag" of these estimates behind other industry sources is now about 3 billion barrels on crude oil alone.

The reserves mentioned are equivalent to more than 12 times the current rate of production of liquids and 20 times that of gas. The industry has productive capacity of approximately 3 million barrels daily above current producing rates. The decline of recent years in exploration and drilling has been influenced by the lack of incentive to continue increasing capacity faster than demand. It does not mean that opportunities to locate new petroleum supplies are exhausted. The current rate of drilling of around 47,000 wells annually is well below the peak of 58,000 wells in 1956, but is certainly adequate to maintain reserves and productive capacity in the light of current and anticipated demands. If the industry merely maintains its present crude oil producing capacity of something more than 10 million barrels daily, it can keep pace with increasing demands for

the next 10 years and still have some spare capacity at the end of the period.

The sound position of the petroleum industry with respect to reserves and productive capacity in its centennial year has not served to silence the prophets of doom. In fact, predictions have been widely circulated recently to the effect that the United States is at or near its peak rate of production and will soon enter a period of steady decline

leading to eventual exhaustion. Since these prophecies assume a peak no higher than the current sustainable productive capacity of the domestic industry and since additional capacity is still being generated, they seem highly questionable. The potentially dangerous impact of these alarms on the public and on government policies makes it advisable to analyze the stated reasons for such conclusions.

Fears of the pessimists

The proponents of pessimism advance a number of reasons for their fears that the United States is running out of oil. It is not possible to consider here all of these reasons in detail. The one most often urged is that major oil fields are becoming increasingly scarce. It would seem, however, that this assumption is based upon a misunderstanding as to the way reserve estimates are made and the effects of time and additional development upon them.

There is also the question of what is meant by a "major" field. The record for the United States shows that for fields with ultimate reserves between 20 million and 100 million barrels, 65 were found in the decade 1919-1928, 141 were found in the decade 1929-1938, 145 were found in the decade 1939-1948, and 85 were found in the decade 1949-1958. All this is *according to January 1, 1959, estimates.* (See Chart 11). But how were these identical fields estimated 10 years ago on January 1, 1949? At that time, 54 fields (instead of 65) were recognized in the first period; 117 (instead of 141) in the second period; and only 80 (instead of 145) were recognized in the decade 1939-1948! In other words, these 80 fields became 145 fields in the 20- to 100-million-barrel range after 10 more years of development and revisions. May we not expect, according to the same pattern, that 10 years from now the 85 fields presently in this category will have become a much larger number?

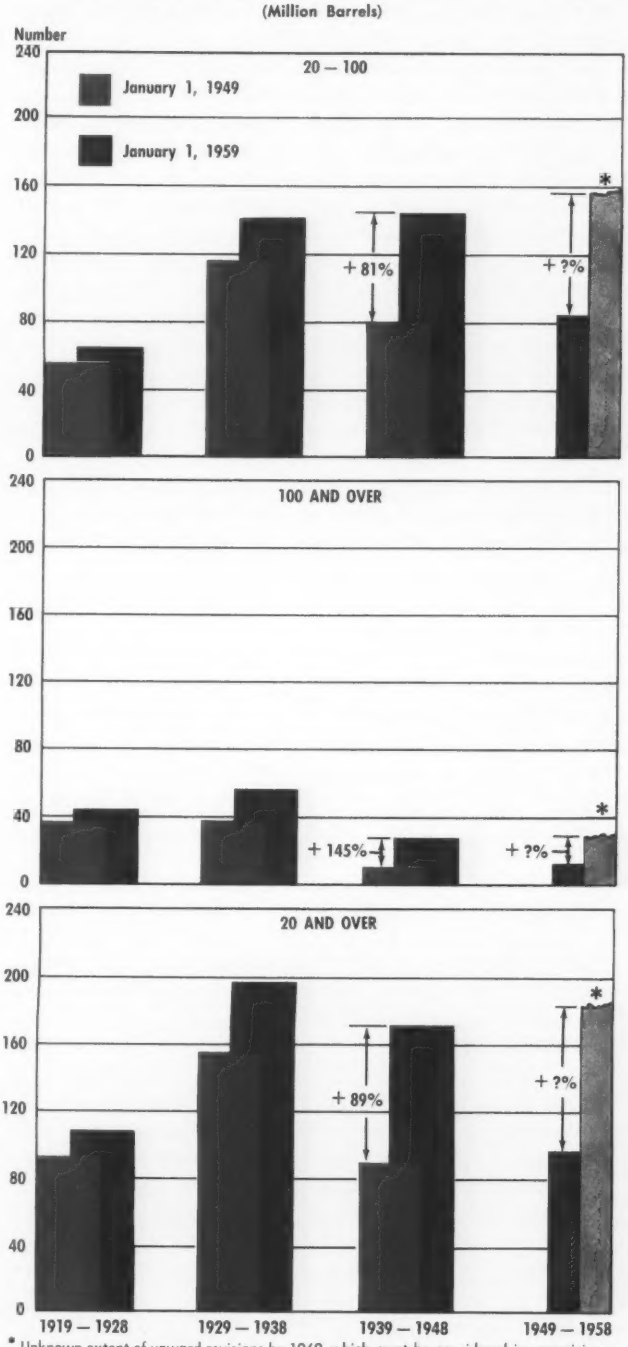
But what of the giant fields—those with 100 million barrels of ultimate reserves or more? Again we look at the record as of January 1, 1959. We find that 44 of these fields were found in the decade 1919-1928, 56 in the decade 1929-1938, 27 in the decade 1939-1948, and 12 in the decade 1949-1958. Again we go back to January 1, 1949, to see how these same fields looked then. We find only 37 (instead of 44) in the first period, 38 (instead of 56) in the second decade, and only 11 (instead of 27) in the decade 1939-1948. Here again 10 years of development has greatly changed the picture. In the last period, the number of fields in this rank was more than doubled!

Thus, in summary, we may say that the number of 20- to 100-million-barrel fields found in the last decade should, on a sound statistical basis, compare favorably with that of any similar period of the past century. Moreover, the number of 100-million-plus barrel fields found during the last 10 years should prove to be as large or larger than the number found in the period 1939-1948. In this connection, it should be said that there are at least 10 additional recent fields already in the 65- to 90-million-barrel range which even now seem to have the earmarks of future 100-million-plus barrel fields. When the 20-million-plus and 100-million-plus fields are thrown together and projected forward to January 1, 1969, there is sound reason to believe that the decade just ending will prove to have furnished large fields at about the same rate as the record performance of the prior 20 years.

This brief review of the growth of reserve estimates following development and revisions over long periods shows why current finding results almost always have compared unfavorably with those of periods several years in the

(Chart II)

LARGE FIELDS BY DECADE OF DISCOVERY AS OF EVALUATIONS ON JANUARY 1, 1949, AND JANUARY 1, 1959



* Unknown extent of upward revisions by 1969 which must be considered in appraising discoveries in recent period.

SOURCE: Humble Studies.

past. Several fields such as Kelsey and Means have graduated into the 100-million-plus class only after more than 20 years of development and study. It is of interest to note that the ultimate reserve estimates of the twenty-seven 100-million-plus fields now credited to the decade 1939-1948 were revised upward from 3 billion barrels to 6 billion barrels during the past decade.

Confusion regarding current exploration results in the United States also arises because the great increase in the number of small fields found recently has caused some people to believe that all discoveries are small. Our own Association statistics on successful new field wildcats indicate an average of 846 new fields a year in the period 1952-1957 compared with an average of 502 a year in the prior five-year period. Actually, the increased number of small fields has been *in addition to,* rather than *in lieu of,* large fields which have been found at normal rates. These small fields represent an added source of supply which has largely been made available through improved technology in both exploration and well completion. It should also be kept in mind that a number of these fields now thought to be small will develop into sizeable reserves.

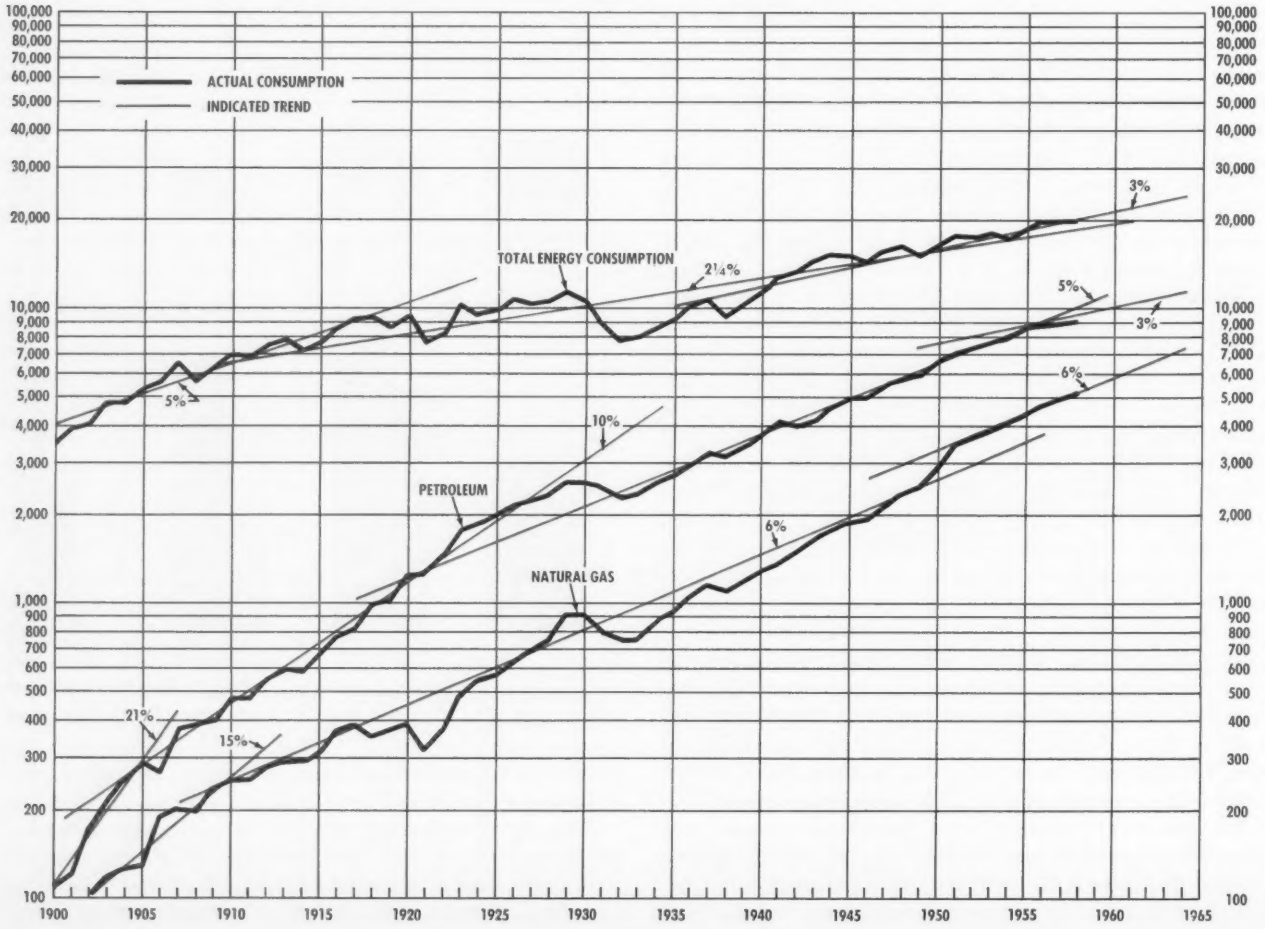
The pessimists also fear that there will be a steady decline in the amount of crude oil developed per well drilled. They divide annual gross additions to crude oil reserves by total new wells and find a downward trend in recent years which they project into the future. There are a number of reasons for questioning the extent of this decline and certainly its projection into the indefinite future.

In the first place, while the practice of dividing gross additions to reserves by wells drilled is reasonably valid over long periods of time in which revisions serve to correct the initial estimates of discoveries, the application of this technique to individual years is fraught with danger. There is little relationship in individual years between wells drilled currently and a substantial part of the gross additions which represent revisions in fields discovered and developed in prior years. Moreover, because of the increased use of new fracturing techniques in shallow areas, many wells have been drilled in recent years for relatively meager results in terms of recoverable oil. The proportion of this type of drilling appears to be declining, in which case its depressing influence on average results will lessen. In addition, the pessimists also err in considering crude oil only and in neglecting the increasingly large gross additions to natural gas reserves. On the basis of gross additions of all petroleum hydrocarbons, the results of the past ten years per well drilled compare favorably with the period 1926-1945.

Even if the pessimists' concept is accepted, there is no basis for assuming a continuing downward trend in reserves

(Chart III) U. S. ENERGY DEMAND IN OIL EQUIVALENT

(Thousand Barrels Daily)



added per well drilled. For example, it appears that 1958 results per well were better than those of 1957. Furthermore, any downward trend of such reserve data could easily be changed or even reversed if cost-conscious operators adopt much wider spacing for development wells with the approval and encouragement of regulatory bodies. Current knowledge of reservoir behavior indicates that only a few wells per section of land are required to drain the average field effectively under existing and foreseeable proration schedules. Therefore, under wider spacing industry results could again show a change in trend, as they did following the introduction of effective conservation regulations.

An appraisal of future prospects

Geologists and geophysicists engaged in petroleum exploration are, and should be, optimistic, but all will agree that any appraisal of the future should be made on a completely objective basis. On such a basis there seems to be reason for considerable optimism about future domestic supplies.

The first important factor is the additional oil that will result from further development, extension, and improvement of primary recovery in fields that have already been discovered. During the 20-odd years that crude oil reserves have been reported by A.P.I., an average of 2.2 billion barrels per year has been added through revisions and extensions of known fields. During the last five years, however, new oil from this source averaged nearly 2.4 billion barrels. In view of the large number of fields found in recent years, the prospects are quite good that estimates of recovery from known fields by present methods will be raised within 10 years by 20 to 25 billion barrels. There is a growing realization that the early estimates of reserves assigned to new discoveries are only a fraction of the total volumes that will ultimately be realized through further development.

Improved methods of secondary recovery provide additional support for an optimistic view about future availability. Paul Torrey has estimated that at least 11 billion additional barrels of oil may be recovered from presently known fields by secondary projects still to be initiated. Beyond that, the industry is at the beginning of the practical application of some important new techniques for additional recovery, such as enriched gas drive and other new reservoir treatments, which may substantially raise later estimates of reserves recoverable by both primary and secondary methods. The importance of such developments is emphasized when one considers that raising the average estimate of recovery from about one-third to only one-half of the oil in place will provide about 20 billion barrels of additional proved oil without drilling a single additional wildcat well.

Another factor that must be considered is the probable success of exploration activities in locating new sources of supply. Here we must take into account the untested prospects already located and future possibilities on some 350 million undeveloped acres currently held under oil and gas leases. On the conservative assumption that only two per cent of this leased acreage will produce oil and that the average ultimate recovery per acre will be 5,000 barrels, the recoverable reserves from new fields on undeveloped acreage held currently may exceed 35 billion barrels. The magnitude of recent bids for state and Indian lands indicates that many companies in the industry expect some sizeable new discoveries to be made in South Louisiana, the Four Corners area, and the continental shelves of Louisiana and California. There will also be much additional leasing of land with other discoveries of oil on acreage thus acquired.

Finally, there are vast new provinces that still remain to be explored thoroughly. These include the tremendous reaches of the new state of Alaska, as well as such areas as the Paradox Basin of the Four Corners area, the Green River Basin of Wyoming, the Delaware Basin of Texas, the masked basins of Nevada, the unexplored parts of the Williston Basin, the South Florida Basin, and a number of other geologic provinces.

The sum of the crude oil that can be counted upon from fields already discovered and from acreage already under lease is, conservatively, in the range of 70 billion barrels to be realized by both primary and secondary recovery methods in the next 20 years. That is not a gloomy outlook for an industry which, according to its past production and present estimate of reserves, has taken 100 years to prove up about 90 billion barrels of crude oil. The industry should be able to continue adding gross petroleum liquids for a number of years at an average rate of 3 to 4 billion barrels annually by the drilling of some 40,000 to 60,000 new wells each year, which is clearly within its ability as demonstrated by the completion of 58,000 wells in 1956. In order to attain these results, however, continuation of present percentage depletion is necessary and imports must not exceed a reasonable level.

Other points to consider

It seems proper to comment on two additional points bearing on the industry's ability to furnish adequate petroleum supplies in the future:

(1) It is not believed to be necessary to provide for a long-term 5 per cent annual rate of increase in domestic demand. Oil and gas together now supply two-thirds of the nation's energy requirements. With gas still gaining position relative to oil and with coal now showing signs of holding its own, it is estimated that oil will henceforth follow the long-term trend of growth in demand for all energy, which is about 3 per cent a year. (See Chart III).

(2) Periodic studies of availability by the National Petroleum Council since 1948 show that productive capacity is increasing at a faster rate than proved reserves with the result that the industry no longer needs as high a ratio of reserves to production. In these circumstances, reserves could be developed more slowly to avoid use of capital prematurely. Influencing factors are fracturing, repressuring, and pressure maintenance, as well as the large number of new small fields which are usually produced at faster rates than those prevalent in large fields.

A final question in appraising the future of domestic oil resources relates to the industry's ability to meet requirements in the distant future beyond the 20-year span under discussion. I am an optimist on this, too, but believe it is futile to make quantitative predictions beyond the fore-

seeable future. I am reminded again of the sage counsel of Thomas B. Nolan who warns of "the dangers of projecting current trends into what we can be sure will be the changed world of tomorrow."

No reason exists either from historical experience or from logic to encourage the belief that even an approximately accurate appraisal of ultimately recoverable petroleum resources in our country can be made. In view of the attention attracted by some of the pessimistic estimates, however, it may be of interest to note some of the more optimistic estimates. In 1956, the United States Geological Survey concluded that a reasonable figure for oil ultimately to be recovered from the United States and adjoining continental shelves might be 300 billion barrels and commented on significant improvements in recoverability now being accomplished or promised in the future. In 1958, an interesting study by Bruce C. Netschert, a member of the staff of Resources for the Future, gave his estimate of a "resource base" of 500 billion barrels of crude oil to which "the industry can apply its ingenuity and science."

No consideration of the future of exploration and development of domestic petroleum can avoid the question of relative costs. The industry has always had to combat the forces pushing it toward diminishing returns, but has been able to offset this tendency over a long period of time by improved technology and constantly better drilling and producing practices. Fortunately, the rate of its technological progress seems to accelerate as time goes on. Over the long run, the price of crude oil has correlated very well with wholesale prices generally, so that the real cost of crude oil has remained relatively constant. A recent paper by Charles Merrill of the Bureau of Mines notes, for example, that in terms of 1954 dollars the real price of crude oil in 1957 was almost the same as the price in 1890. The domestic industry can, and should, be expected to check any trend toward pricing itself out of the market. Its past performance supports the belief that it will continue to make oil economically available to its customers.

Conclusion

In conclusion, I reiterate the following points which are considered to be important:

(1) Through a century of dynamic progress, the domestic petroleum industry has consistently outrun in actual performance the gloomy predictions as to its ability to find oil, increase reserves, and maintain producibility.

(2) During the last 33 years of petroleum exploration and development, the outstanding progress of the industry can be attributed to its utilization of scientific exploration methods and enlightened engineering and conservation practices.

(3) In the centennial year of our industry, proved reserves of liquid petroleum and gas are at an all-time peak, and current producing capacity is 3 million barrels per day above present production.

(4) On a sound statistical basis, the number of fields with ultimate reserves of 20 million barrels or more found in the last 10 years should prove to be as high as in any prior decade, not even excluding the record period immediately preceding it.

(5) There is a firm basis for believing that discoveries and reserves of petroleum can keep pace with increasing domestic requirements over a long period. In the next 20 years, with little allowance for increased recovery due to improved techniques, a minimum additional supply of 70 billion barrels of crude oil can be counted upon from fields already discovered and acreage already under lease.

Following these conclusions, it should be emphasized that the prospects for the domestic petroleum industry as outlined here could be changed to a disappointing degree by unwise actions of the federal government, state regulatory bodies, or the industry itself on such matters as conservation, percentage depletion, and import policy. It has taken a hundred years to build the present strength of the domestic petroleum industry, and every effort should be made to preserve its vigor.

Finally, I wish to say that, in my opinion, it is not in the best interest of our nation or of this industry to underrate either its past achievements or its capacity for future progress. On the contrary, I consider it our duty as citizens and as explorers for petroleum to present to the American public, our client, the clearest picture possible of present and future domestic oil supplies. On that score, it is difficult to see how there could be important difference among those who have examined the same basic facts.

The remarkable accomplishments of our industry hint at the opportunities that must lie ahead. If we are alert to them and capitalize upon them, the future may overshadow the achievements of the past, and domestic petroleum supplies will contribute to our economic welfare and national security for many years to come.

Direct seeding by a low flying airplane is the modern way to plant pine trees. In farming a pine forest, the Humble Company utilizes this new method and other time-tested forestry practices including timber stand improvement, fire suppression, and selective harvesting.

Trees for Tomorrow

Humble pine farm on 46,000-acre tract demonstrates value of conservation and forest management

THE December air was crisp and still—the morning sun scarcely up—as the single-engine airplane came into view. Dodging down between two scraggly pine trees, it hedge-hopped across an open field that was barren except for a few clusters of charred stumps. Then it pulled up sharply, banked into a graceful turn and once again swooped low over the field, this time releasing a shower of tiny pink pellets.

This could have been a crop-duster at work or even a stunt flyer on a busman's holiday, but it was neither. The pink shower consisted of thousands of asphalt-coated pine seed. This pilot was planting a pine forest for Humble Oil & Refining Company.

Here, in the heart of Louisiana pine country, Humble is operating a big green tree farm in partnership with Mother Nature. Started just three years ago, a vigorous reforestation program on a 46,000-acre woodlot is already blazing trails of scientific forest management. It is convincing illustration of one of Humble's basic policies: to improve the recovery and utilization of resources by originating and supporting sound conservation practices which serve both the public and corporate interest.

> "A people without children would face a hopeless future; a country without trees is almost as helpless. Forests which are so used that they cannot renew themselves will soon vanish, and with them all of their benefits. When you help to preserve a forest or plant new ones you are acting the part of good citizens."
>
> —*Theodore Roosevelt*

Humble's acreage, a checkerboarded, rectangular tract roughly 8 by 14 miles, is located in three parishes—Rapides, Vernon, and Allen—and next door to Kisatchie National Forest. These 46,000 acres constitute the second largest tract of the Company's widely-dispersed "fee lands," property which Humble owns outright.

Several little creeks wander aimlessly across the land, and the woods are full of wildlife of every description. People live here, too—about 190 families, in fact. Scattered here and there are small dairies, country stores, churches, a rural school, and a service station.

The land itself is rolling, grassy, and sparsely settled with pines of sundry sizes planted by nature. There are also great barren stretches standing with pine stumps—cruel monuments

Pine plantation started in winter of 1956-57 is knee-high and growing fast. Clyde Whitley, left, and Harvey Condron, head of Company fee lands, examine map to locate its boundaries.

to the old lumber motto of the 20s and 30s: "Cut out and get out." Hidden in the grass are multitudes of young pines planted by man; there's not much top soil, but this is great country for growing pine trees.

Humble bought this property as cut-over lands from a large lumber company back in 1932. Why did the Company suddenly decide to enter the timber business 25 years later?

The action was influenced by a combination of factors: (1) A 1955 charter change which permits the Company to engage in a diversity of business enterprises; (2) A 1954 change in Louisiana tax law that made timber growing economically feasible; (3) An economic necessity to place idle fee lands on a self-sustaining footing; and (4) A Company desire to contribute to conservation of natural resources and the prosperity of the community and state.

The whole idea of Humble's woodland project is to make the land green and productive—not for timber alone, but for a variety of worthwhile purposes: to build a better soil, prevent erosion, protect watersheds, provide a haven for fish and game, and establish recreational areas. Possibly some day the land may yield oil and gas, or other valuable minerals. Meanwhile, it is helping replenish the country's timber resources and making way for more industries and jobs.

Forests, like oil, are high on the list of U. S. natural resources. Unlike oil, they are a renewable resource. With proper management, they can be induced to grow as fast—even faster—than they are used up. Modern forestry, therefore, treats trees not as a reservoir to be tapped until it runs out, but as a crop to be farmed for sustained yield.

Humble's pine lands are carefully tended by a lone Company employee who works full-time with a professional forester and five workers from Farmcraft Associates, Inc., a forest management firm. These men, all veteran woodsmen, carry out a multiphase forest management program that embraces sale and removal of stumps, planting and seeding, fire protection and control, timber stand improvement, and selective harvesting. They care for their pine crops as zealously as any wheat or cotton farmer.

Deadening of hardwoods permits young pine trees to grow without unfair competition.

THE first planting, with pine seedlings from state-operated nurseries, was on December 8, 1956. The method is still in use. A man sits astraddle a special planting plow, pulled by a tractor. As the blade slices a narrow incision in the earth, he drops in a seedling, and the plow rakes the dirt back into place. Spacing is six feet between seedlings and eight feet between rows. A three-man crew using this rig, can plant 14 acres a day, putting 14,000 plants into the soil. About 90 per cent will survive unless a severe drouth comes.

A major advance in seeding barren pine lands came on the forestry scene about the same time as Humble. This is direct or aerial seeding, a method which works very nearly like nature. Bird-repellent treated pine seeds are dropped from a low-flying airplane and scattered evenly over a 66-foot wide strip by propeller "wash." One Humble tract of 1,340 acres was successfully seeded from the air in only five hours and 50 minutes. To plant that acreage with seedlings in the same time would require 200 planting machines and a minimum of 600 men.

"With all our planting and seeding," says Harvey Condron, who heads up the fee land section of Humble's Exploration Department, "we have to hustle to keep up with Mother Nature. She plants a pine tree every time we do. Maybe two."

Natural regeneration by mature seed trees is encouraged through a program of "timber stand improvement." This TSI work, as it is known in forest talk, entails killing out—selling, if possible—undesirable hardwoods so that young pines can make headway without competition. Gird-

ling the unwanted trees and treating them with a chemical usually does the trick. Left behind, however, are "den" trees, the home of wildlife such as squirrel.

Before reforestation was begun three years ago, 29,000 of Humble's acres lay denuded and fruitless. Now, as a result of planting and natural seeding, all but 9,000 of these acres are in pine production. The remainder will be planted out in the next five years.

"Once our planting cycle is completed in 1964," says Landman Condron, "we'll never have to plant again, barring disaster. This is exactly what we're shooting at—a perpetual crop."

Disaster in the Louisiana pine belt comes chiefly in two forms: wildfire and wild hogs.

Hogs, which roam the creek bottoms in herds, have ravenous appetites for the tender, starchy taproots of the long leaf pine seedling, the species comprising three-fourths of Humble's trees. A single piney woods rooter can destroy a whole acre in a day; he can also kill or cripple teen-age pines by devouring their shallow feeder roots. This is a low-class hog, hardly more domestic than a javelina, but you can't harm him because he may belong to somebody. Open range still exists in Louisiana.

FIRE is the big threat, however. The South has 80 per cent of the nation's forest fires and Humble's lands sit squarely in an area that experiences more fires each year than any other similar area in the United States. When the Company's forest management program was begun in 1956, observers estimated that about 90 per cent of the acreage was being burned over each year. By 1958, this had been reduced to about four per cent.

This record in one of the state's hottest fire spots is no accident; it comes through hard work and constant vigilance by well-trained fire-fighting crews. The number of fires is still sizeable—averaging three a week in the big danger season from October through March—but most are snuffed out quickly. "A forest fire is like a tiger," says one seasoned smoke-eater. "Even when it's small, you have to show it plenty of respect because, large or small, it's still a tiger."

Humble's fire-fighting apparatus consists of a small tractor fitted with a fire plow and a flatbed truck equipped with two-way radio. Most fires are quickly spotted by the state ranger on duty in the Plainview observation tower, which stands on Humble land. He dispatches a Louisiana state crew to the scene and at the same time notifies the Humble fire-fighting team. Hurrying to the blaze, they unload the tractor and plow a fire break to contain it. If it looks like a "hot one" they may back-burn to destroy the wildfire's source of fuel.

Pine stump removal prepares the land for planting and seeding. Bulldozers root them up; at nearby stump mills they are pulverized and their resin and turpentine oils extracted.

Sometimes, too, they use fire to prevent fire. Prescribed burning of grass and underbrush reduces the fire hazard and prepares the soil for seeding. Before any prescribed burn is attempted, however, conditions of humidity, wind, and surface moisture must be perfect, and the fire towers are alerted.

One of the most important facets of Humble's reforestation program is a consistent good-neighbor policy which results in excellent cooperation from the tenants. Families already living in

Tree planting field that cannot be aerially seeded, man and machine work together. Man on planter, rear, places pine seedling in the soil every six feet. Team plants 14 acres a day.

At Plainview School, Humble's forester shows high school boys how to plant pine seedlings by hand. They planted 14,000 on an 80-acre plot set aside by the Company as a school forest.

the woods are allowed to remain there and cut fire wood. The Humble forester also gives advice and help to small landowners who want to grow pines on their own land. Right-of-way clearance has been cheerfully granted for roads, telephone and power lines into the community. Several church and cemetery sites, all donated by the Company, dot the property. And as an extension of this attitude, hunters and picknickers are welcome.

The Plainview Rural School, situated on a little knoll of Company property, is surrounded by 80 acres designated by Humble as a school forest. The students are planting trees on the plot under the guidance of Printis Murphy, a professional forester representing the Humble Company. This acreage will finally be planted out by the senior class of 1964, and within a few years the school will begin to harvest all the income from the trees.

"We can't always convince the old folks that tree farming is a good thing for everybody concerned," says Forester Murphy. "Boys and girls, we can."

Forestry is no get-rich-quick business, and Humble has no plans for becoming a Paul Bunyan among timber-growers, but the Company should reap a reasonable profit from its tree farm over the coming years. The average tree farmer, says the Louisiana Forestry Commission, can expect an annual income of $10 an acre once his land is in full production.

The first cut from pines that Humble is planting today will be made in about 1970 in the form of pulpwood and poles. The plantations will yield no full-grown sawlogs—the kind of lumber needed to build houses—until sometime past the year 1985. Meanwhile, however, income will be realized from naturally regenerated pine and, through 1960, from the sale of pine stumps for their valuable resin and turpentine oils.

The long range future of timber, with its 6,000 products, looks bright. Demand, spurred by population increases and soaring per capita consumption of paper and other wood products, promises to be ever-increasing.

At the turn of the century, most of Louisiana was forest land, a rich green blanket of virgin timber. But by the 1930s millions of acres lay bare and unproductive in the wake of short-sighted cutting policies; the state was on the brink of forest poverty.

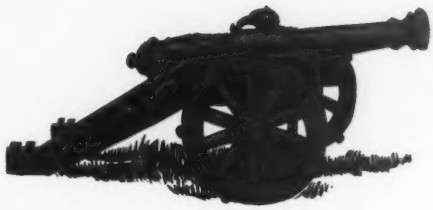
Today, Louisiana forests are on the road back. Forestry vision and leadership, coupled with ideal growing conditions, have restored the timber economy to the extent that one person in three works in forest products.

This time, the lofty pine is in Louisiana to stay.

Prescribed burning of grass by Humble fire crew reduces fire hazard and clears field where pine seeds will fall and start their growth.

Piney woods rooter is the big enemy—second only to fire—of the pine forest. A single hog can devour an acre of seedlings in a day.

SAM HOUSTON'S REPORT OF THE BATTLE OF SAN JACINTO



It has been 123 years since the ragged army of determined Texans defeated the forces of Santa Anna at San Jacinto and changed the course of world history. Here is the victorious commander's own description of the battle.

Headquarters of the Army,
San Jacinto, April 25, 1836.

To David G. Burnet,
President of the Republic of Texas:

Sir: I regret extremely that my situation, since the battle of the 21st, has been such as to prevent my rendering you my official report of the same previous to this time.

I have the honor to inform you that, on the evening of the 18th inst., after a forced march of fifty-five miles, which was effected in two days and a half, the army arrived opposite Harrisburg. That evening a courier of the enemy was taken, from whom I learned that General Santa Anna, with one division of his choice troops, had marched in the direction of Lynch's ferry, on the San Jacinto—burning Harrisburg as he passed down.

The army was ordered to be in readiness to march early on the next morning. The main body effected a crossing over Buffalo bayou, below Harrisburg, on the morning of the 19th, having left the baggage, the sick, and a sufficient camp-guard, in the rear. We continued to march through the night, making but one halt in the prairie for a short time, and without refreshments. At daylight we resumed the line of march, and in a short distance our scouts encountered those of the enemy, and we received information that General Santa Anna was at New Washington, and would that day take up the line of march for Anahuac, crossing at Lynch's ferry. The Texan army halted within half a mile of the ferry, in some timber and were engaged in slaughtering beeves, when the army of Santa Anna was discovered to be approaching in battle array, having been encamped at Clopper's point, eight miles below. Disposition was immediately made of our forces, and preparation for his reception. He took a position with his infantry, and artillery in the centre, occupying an island of timber, his cavalry covering the left flank. The artillery, consisting of one double-fortified medium brass twelve-pounder, then opened on our encampment. The infantry, in column, advanced with the design of charging our lines, but were repulsed by a discharge of grape and canister from our artillery, consisting of two six-pounders. The enemy had occupied a piece of timber within rifle-shot of the left wing of our army, from which an occasional interchange of small-arms took place between the troops, until the enemy withdrew to a position on the bank of the San Jacinto, about three-quarters of a mile from our encampment, and commenced fortification.

A short time before sunset, our mounted men, about eighty-five in number, under the special command of Colonel Sherman, marched out for the purpose of reconnoitering the enemy. While advancing they received a volley from the left of the enemy's infantry, and, after a sharp rencounter with their cavalry, in which ours acted extremely well, and performed some feats of daring chivalry, they retired in good order, having had two men severely wounded, and several horses killed. In the meantime, the infantry under the command of Lieutenant-Colonel Millard, and Colonel Burleson's regiment, with the artillery, had marched out for the purpose of covering the retreat of the cavalry, if necessary. All then fell back in good order to our encampment about sunset, and remained without ostensible action until the 21st, at half-past three o'clock, taking the first refreshment which they had enjoyed for two days. The enemy in the meantime extended the right flank of their infantry, so as to occupy the extreme point of a skirt of timber on the bank of the San Jacinto, and secured their left by a fortification about five feet high, constructed of packs and baggage, leaving an opening in the centre of the breastwork, in which their artillery was placed, their cavalry upon their left wing.

About nine o'clock on the morning of the 21st, the enemy were reinforced by five hundred choice troops, under the command of General Cos, increasing their effective force to upward of fifteen hundred men, while our aggregate force for the field numbered seven hundred and eighty-three. At half-past three o'clock in the evening, I ordered the officers of the Texan army to parade their respective commands, having in the meantime ordered the bridge on the only road communicating with the Brasos, distant eight miles from our encampment, to be destroyed

(continued)

The Charge at San Jacinto

E. M. Schiwetz

(Sam Houston's Report—continued)

—thus cutting off all possibility of escape. Our troops paraded with alacrity and spirit, and were anxious for the contest. Their conscious disparity in numbers seemed only to increase their enthusiasm and confidence, and heightened their anxiety for the contest. Our situation afforded me an opportunity of making the arrangements preparatory to the attack without exposing our designs to the enemy. The first regiment, commanded by Colonel Burleson, was assigned to the centre. The second regiment, under the command of Colonel Sherman, formed the left wing of the army. The artillery, under the special command of Colonel George W. Hockley, inspector-general, was placed on the right of the first regiment; and four companies of infantry, under the command of Lieutenant-Colonel Henry Millard, sustained the artillery upon the right. Our cavalry, sixty-one in number, commanded by Colonel Mirabeau B. Lamar (whose gallant and daring conduct on the previous day had attracted the admiration of his comrades, and called him to that station), placed on our extreme right, completed our line. Our cavalry was first despatched to the front of the enemy's left, for the purpose of attracting their notice, while an extensive island of timber afforded us an opportunity of concentrating our forces, and deploying from that point, agreeably to the previous design of the troops. Every evolution was performed with alacrity, the whole advancing rapidly in line, through an open prairie, without any protection whatever for our men. The artillery advanced and took station within two hundred yards of the enemy's breastwork, and commenced an effective fire with grape and canister.

Colonel Sherman, with his regiment, having commenced the action upon our left wing, the whole line, at the centre and on the right, advancing in double quick time, raised the war-cry, "Remember the Alamo!" received the enemy's fire, and advanced within point-blank shot, before a piece was discharged from our lines. Our line advanced without a halt, until they were in possession of the woodland and the enemy's breastwork—the right wing of Burleson's and the left of Millard's taking possession of the breastwork; our artillery having gallantly charged up within seventy yards of the enemy's cannon, when it was taken by our troops.

The conflict lasted about eighteen minutes from the time of close action until we were in possession of the enemy's encampment, taking one piece of cannon (loaded), four stand of colors, all their camp equipage, stores, and baggage. Our cavalry had charged and routed that of the enemy upon the right, and given pursuit to the fugitives, which did not cease until they arrived at the bridge which I have mentioned before—Captain Karnes, always among the foremost in danger, commanding the pursuers. The conflict in the breastwork lasted but a few moments; many of the troops encountered hand to hand, and, not having the advantage of bayonets on our side, our riflemen used their pieces as war-clubs, breaking many of them off at the breech. The rout commenced at half-past four, and the pursuit by the main army continued until twilight. A guard was then left in charge of the enemy's encampment, and our army returned with their killed and wounded. In the battle, our loss was two killed and twenty-three wounded, six of them mortally. The enemy's loss was six hundred and thirty killed, among whom was one general officer, four colonels, two lieutenant-colonels, five captains, twelve lieutenants; wounded two hundred and eight, of which were five colonels, three lieutenant-colonels, two second lieutenant-colonels, seven captains, one cadet; prisoners seven hundred and thirty—President-General Santa Anna, General Cos, four colonels, aides to General Santa Anna, and the colonel of the Guerrero battalion, are included in the number. General Santa Anna was not taken until the 22nd, and General Cos yesterday, very few having escaped. About six hundred muskets, three hundred sabres, and two hundred pistols, have been collected since the action. Several hundred mules and horses were taken, and nearly twelve thousand dollars in specie.

For several days previous to the action, our troops were engaged in forced marches, exposed to excessive rains, and the additional inconvenience of extremely bad roads, badly supplied with rations and clothing; yet, amid every difficulty, they bore up with cheerfulness and fortitude, and performed their marches with spirit and alacrity—there was no murmuring.

Previous to and during the action, my staff evinced every disposition to be useful, and were actively engaged in their duties. In the conflict I am assured that they demeaned themselves in such a manner as proved them worthy members of the army of San Jacinto. Colonel T. J. Rusk, secretary of war, was on the field. For weeks his services had been highly beneficial to the army. In the battle, he was on the left wing, where Colonel Sherman's command first encountered and drove in the enemy; he bore himself gallantly, and continued his efforts and activity, remaining with the pursuers until resistance ceased.

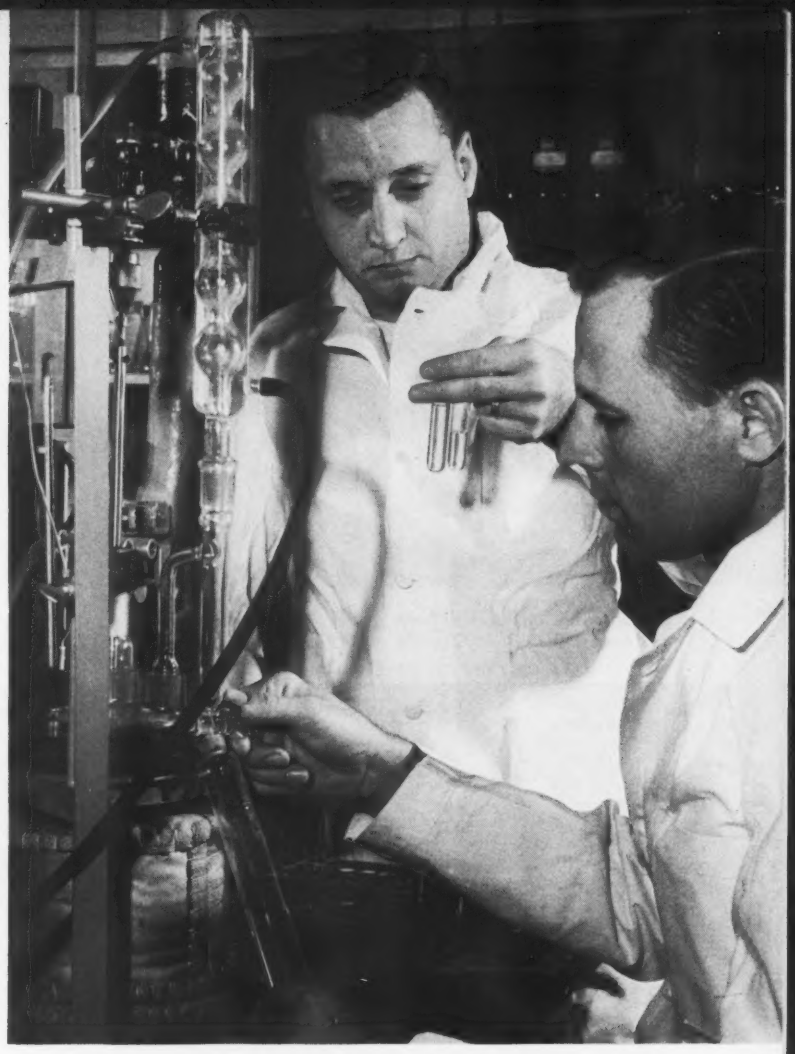
I have the honor of transmitting herewith a list of all the officers and men who were engaged in the action, which I respectfully request may be published, as an act of justice to the individuals. For the commanding general to attempt discrimination as to the conduct of those who commanded in the action, or those who were commanded, would be impossible. Our success in the action is conclusive proof of their daring intrepidity and courage; every officer and man proved himself worthy of the cause in which he battled, while the triumph received a lustre from the humanity which characterized their conduct after victory, and richly entitles them to the admiration and gratitude of their general. Nor should we withhold the tribute of our grateful thanks from that Being who rules the destinies of nations, and has, in the time of greatest need, enabled us to arrest a powerful invader while devastating our country.

Sam Houston,
Commander-in-Chief

☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆

Problems are their Specialty

Special Products Plant employees make wide variety of coatings, chemicals, lubricants for industry



In laboratory at Humble's Special Products Plant chemists conduct experiments in effort to develop another new product for oil field use.

ONE morning a few months ago, an urgent message arrived at Humble's Special Products Plant in Houston. It was an emergency order from a contractor in Kobe, Japan. He needed 10 gallons of a special formula chemical-resistant aluminum paint, and he needed it in a hurry. Could Humble ship it at once, by air express?

Ordinarily, such a rush order for a non-stock item would be an anathema to a manufacturing plant because it would disrupt operating schedules. But to employees of Humble's Special Products Plant, emergency orders are all in the day's work. Quickly, and with hardly a raised eyebrow, they set up their equipment, whipped up a special batch of the coating, and rushed it to the airport.

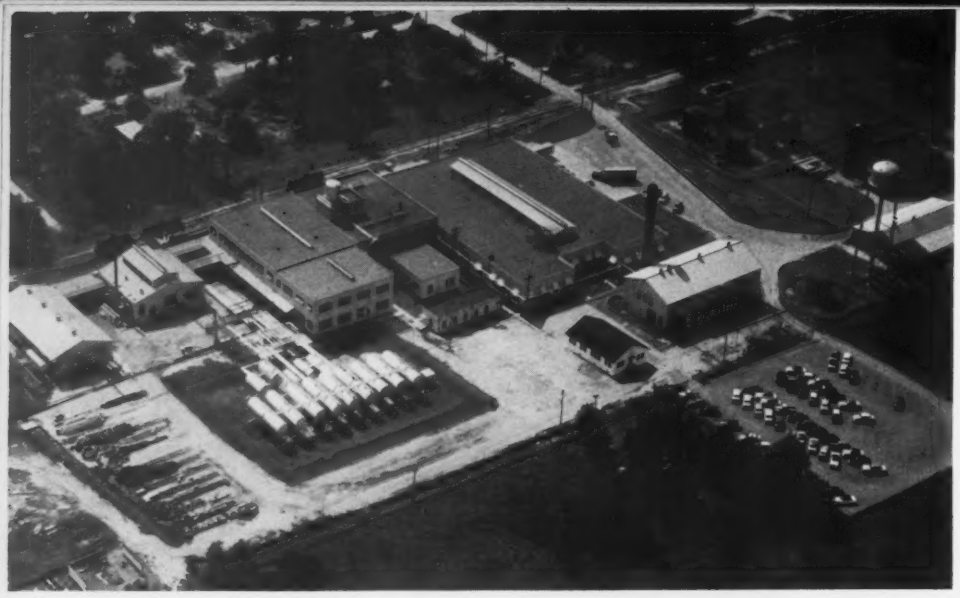
A few days later, the anxious contractor in Japan received his 10 gallons of paint. He may have raised *his* eyebrow, however, when he found that the express bill was 10 times as much as the cost of the paint itself.

While that incident may not be exactly typical of the Special Products Plant's operations, it does serve as a good example of one of the plant's principal features—versatility. The 81 Humble employees who operate the various paint mills, mixing vats, blending tanks, and other equipment in this 10-acre plant site, turned out more than 300 different products last year. Each was a special product, formulated in the plant's own laboratories to meet specific problems.

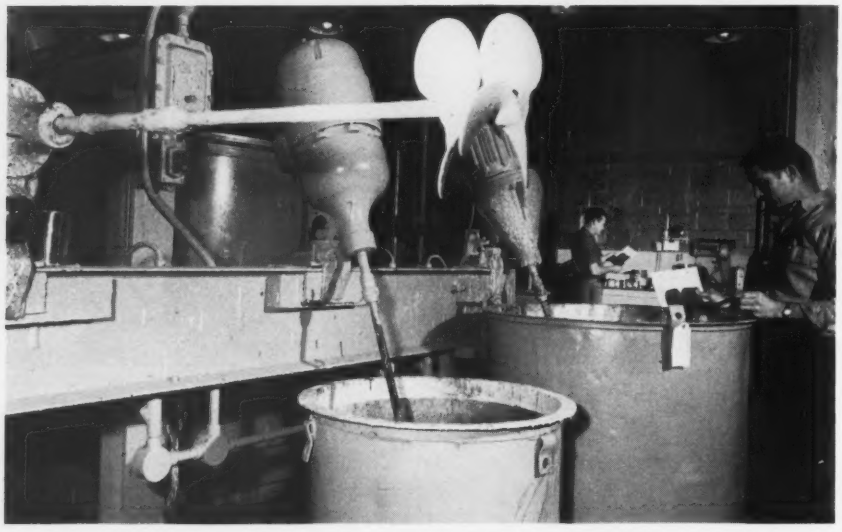
Generally, these products are special purpose protective coatings, chemicals, lubricants, oils, and cleaners. Most of them were developed primarily for use in Humble's own operations. But some—notably the *Rust-Ban* coatings —have won such wide acceptance outside the Company that they have become standard-line products which are kept in stock and sold through regular Marketing Department outlets to customers all over the world.

The whole thing started with a problem, back in the early '30s. Humble service station operators were having trouble with the liquid soap provided by the Company for use in the restrooms. It was clogging the dispensers, and sometimes caused minor skin irritation. Unable to find a satisfactory soap on the market, the Company set up a small laboratory in the basement of the Humble Building and assigned researchers to the task of developing one. The result was an improved type of non-clogging, non-irritating liquid product.

More and more problems were brought to the laboratory group for



Special Products Plant covers about 10 acres in Houston. Here 81 Humble employees last year turned out about 2½ million gallons of paints, chemicals, lubricants, oils, cleaners.



In coatings section of plant, paint is tinted to match specifications. Nature of operation dictates that production be on a batch basis, rather than continuous flow as in a refinery.

solution, until finally the operation outgrew its limited space. The lab was moved to roomier quarters at Humble's Fuel Oil Terminal, near the Houston Ship Channel turning basin, and gradually expanded to become a full-scale special products manufacturing plant.

One of the first big jobs tossed into the laps of the specialty lab researchers was that of developing a rust preventive, something that could be used to protect the Company's tools, machines, and other metallic equipment from corrosion. The most urgent need was for a non-drying type of coating that would be economical in cost, could be applied easily, and would be easy to remove.

The chemists came up with a product that met all these requirements. It was given the name *Rust-Ban,* and proved an immediate success, not only for Company use but with industrial and agricultural customers as well. Subsequently, to meet other problems of rust and corrosion, the special products plant developed a whole family of more than 200 *Rust-Ban* products. Some are non-drying coatings, ranging from special thin, colorless oils to heavy, grease-type coatings. Others are hard-drying materials that look like paint, but are much cheaper than ordinary paint in protecting metal.

It's a short step from making coatings that look like paint to making paint itself. The Special Products Plant entered the paint manufacturing field

Operator adds ingredients in manufacture of oil field chemical; plant turned out more than 75 different chemicals last year.

Automatic equipment fills, seals 20 cans of coating per minute; other products such as chemicals are packaged in 55-gallon drums.

primarily to provide a better coating material for Humble service stations and bulk stations. The new paints developed by the laboratory proved so satisfactory for Company use that industrial customers began to inquire about them. As a result, the plant now manufactures—and the Marketing Department sells—a complete line of interior and exterior paints, and enamels.

Sometimes, however, an industrial customer calls on Humble for special purpose paints not included in the standard-line. Not long ago, a refiner in Louisiana found that he needed 14 different colors of paint, each of which had to conform to seven different chemical specifications. The special coatings lab and manufacturing plant were able to fill the order without delay.

The plant also turns out a host of other kinds of products such as detergents, oil field chemicals, and various types of special lubricants. Many of these items are sold under trade-marked names.

Under the name *Thredkote,* for example, are seven different compounds designed to lubricate and seal threaded pipe joints to hold high pressures. Another compound, *Thredlok,* locks and seals threaded connections without welding. *Multikut* is a multipurpose cutting oil used to facilitate metal-machine operations.

In the oil field chemicals line, Humble's specialty plant manufactures a variety of unusual products. One is *Corexit,* used to prevent corrosion caused by certain gases and brine in oil and gas condensate wells, and at oil field installations. *Breaxit* compounds are used to break up troublesome emulsions of salt water and oil. *Plug-Ban,* one of the newest products in Humble's oil field chemical line, is a perforating fluid which helps in obtaining clean perforations in oil wells.

ABOUT 60 per cent of the total production of the plant now goes to customers outside the Company. Even so, the nature of the plant's operations dictates that production be on a batch basis, rather than continuous flow as in a refinery. When inventories of the stock items fall below certain levels, new batches are made up, packaged, and put on the shelves.

There are two good reasons for the batch type of operation. In the first place, most special products are not needed in large quantities. Secondly, the batch method permits more flexibility of operation; emergency orders for non-stock items can be handled more easily.

And there are frequent emergency orders for small quantities of special products. The laboratory staff works closely with the Sales Technical Service engineers of the Marketing Department in helping to solve special problems for customers. Often, this requires the preparation of new formulas, or a quick run of a product not kept in stock.

Suppose, for example, an industrial plant manager has an unusual protective coating problem. He takes it up with the Humble wholesale agent in his town, and he, in turn, calls for help from the Sales Technical Service. Usually, the problem can be solved with some of the special products already available from existing formulas. If not, the engineer may refer the problem to the coatings laboratory of the Special Products Plant. In most cases, the chemists can come up with a new product that solves the problem.

In addition to the Sales Technical Service group, the plant has the cooperation of Humble's Production and Manufacturing organizations, both for technical assistance and in helping to develop new products.

Nobody knows what new problems the Special Products Plant may be called upon to solve in the future, or what kinds of new and unusual products will be developed here. Doubtless, the growing emphasis on petrochemicals will have a strong influence on the plant's operations. There are countless potential uses of the petrochemicals being produced at Humble's Baytown Refinery, and the Special Products Plant can be expected to help develop some of these into new and practical products.

In this versatile plant every new project is a challenge, the unusual is routine, and problems are a specialty.

Stocks of regular-line products are maintained in big warehouse; as the inventories on these items fall, new batches are made up.

Humble engineers and technicians in the field work closely with Special Products Plant chemists in developing many new products.

Bear Creek site before abandonment as dry hole. Winding road goes past helicopter hangar (lower right) and crew's camp, to drilling location. Well was joint venture with Humble as operator on a lease owned by Shell Oil Company.

DISAPPOINTMENT AT BEAR CREEK

After 18 months of effort, Humble abandons its first Alaskan well as a dry hole

ON A snowswept hilltop, 330 trackless miles southwest of Anchorage, a cement-plugged hole now marks the site of Humble's first wildcat venture in Alaska. As so often happens in the business of oil prospecting, the well was dry.

This was the Humble-Shell Bear Creek Unit No. 1, abandoned on March 18 after almost a year and a half of drilling under some of the most rigorous conditions and disheartening handicaps ever experienced on any Humble wildcat well. During those 18 months, the men at Bear Creek were buffeted by winds of hurricane force, deluged by rains of tropical intensity, buried under massive snowdrifts, and chilled in icy blasts of polar air which tumbled temperatures far below zero.

Yet, they managed to push their drilling bit 14,374 feet down beneath the frozen tundra to set a new depth record for Alaska—only to learn that there was no recoverable oil or gas in any of the formations penetrated.

When the project was all done, Humble could chalk it up as the most expensive dry hole in the Company's history.

Because of the isolated location, far out on the Alaska peninsula, the Bear Creek wildcat operation had to be planned and executed as carefully as a military invasion. Since there were no roads in the area, all transportation to and from the site had to be either by water or air.

The project began in the summer of 1957, when all equipment, housing facilities, materials, and supplies for a year's operation were assembled at Seattle, loaded on barges, and towed 2500 miles up the coast to Jute Bay, on the Alaska peninsula. Here a beachhead was established in July, and the

STORY BEHIND THE STORY

Of all dollars, someone has said, the most cautious is the "risk dollar." But if the petroleum industry did not risk literally hundreds of millions of dollars each year on hazardous wildcat drilling, the search for new reserves would come to a sudden halt, and we would all soon feel the pinch of inadequate oil supplies for our economic progress and national security.

Without assurance that percentage depletion will be maintained at its present rate, there would be inadequate incentive to risk the tremendous amounts of money against long odds in exploratory drilling. Wells such as the wildcat at Bear Creek might never be drilled. The search for oil would be dangerously impaired, and the oil potentiality of many areas might forever remain unknown.

road-building crew started carving out a roadway five winding miles up the hillside to the drilling site. A permanent camp was soon established with complete facilities for year-round living and working. Finally, the drilling rig was hauled in and set up. On September 23, in a driving rainstorm, the crew spudded in the well.

And the rains continued. In a 32-day period starting in mid-October, the gauges at Bear Creek measured more than 41 inches of rain, mostly accompanied by strong winds. To the men on the drilling platform it always seemed to be raining horizontally.

As winter set in, the rain slackened and turned into snow. Temperatures dropped, but the wind didn't. On five days that first December, the frigid winds exceeded 100 miles per hour velocity, and on one of those days the thermometer registered 22 degrees below zero!

But weather was only one of the problems. The project also was plagued with troubles deep down in the hole itself. The drillers found some formations so hard that rock bits wore out in two hours of drilling. There were places where treacherous sidewalls caved in. At one disastrous point, 21 drill collars were stuck in the hole, and the crew spent the next 112 days trying to fish them out. Unable to retrieve the last drill collar, the crew finally had to back up, set whipstocks to divert the bit, then sidetrack around the obstruction. This, too, developed some complications, and required about two months to accomplish.

By the time the well reached a depth of 14,374 feet, it was apparent that it was doomed to be a dry hole. A total of 28 cores and nine drill-stem tests had failed to find any encouraging prospects of commercial oil or gas. There was nothing left to do but plug and abandon the hole.

Ironically, even after a hundred years of progress and improvement, the oil industry is still bound to the inescapable fact that to find oil you must drill for it. And the industry's records also show that when you drill for oil in an unproven area, your chances for success are no better than about one in nine.

Like other oil prospectors, Humble must keep trying to beat the odds. The Bear Creek wildcat was one of those attempts that failed.

Wind-whipped snow makes bleak winter scene at Bear Creek camp. One December day during first winter, wind picked up a warehouse, lifted it 200 feet into air, and demolished it.

Drilling crews worked in snow, rain, and wind for almost 18 months at Bear Creek. They were contract employees of Rowan Drilling Company; Humble owned rig and all equipment.

On ice-choked Jute Bay, a supply barge waits out the winter. It took eleven barge loads of equipment and supplies, towed in five trips from Seattle, to get Bear Creek well underway.

1958 Annual Report Reflects Year Of Pressures and Problems

HUMBLE'S Annual Report for 1958, distributed to shareholders and employees late in March, reflects the pressures and problems of the domestic petroleum industry as it approaches the end of the first century since the discovery of oil in Pennsylvania.

The year 1958 was characterized by weak demand, large inventories, and excessive imports. Total demand, production, and refinery runs were all lower than the previous year.

As with the industry generally, most of Humble's operations during the first half of the year were sharply below 1957 levels. There was considerable improvement during the second half, but earnings for the entire year were down more than $39,000,000.

Net income for 1958 dropped to $136,543,200, or $1.89 a share. This represented a return of about 10 per cent on the shareholders' investment, which at the end of the year amounted to $1,390,000,000. Dividend payments were $1.40 a share.

The 42nd annual report shows that the taxes paid by Humble last year to federal, state, and local government amounted to $110,864,000. This total tax bill included excise taxes on products sold, production and ad valorem taxes, and federal income taxes.

Humble reduced its capital expenditures from $235,000,000 in 1957 to $155,000,000 in 1958. This change was the result of less drilling and of smaller outlays on manufacturing and marketing. In addition the Company also spent $93,000,000 on exploration activities.

The Company drilled 557 exploratory and development wells in 1958, or 310 fewer than the year before. Total drilling expenditures decreased even more sharply because of a reduction in the number of expensive offshore completions from 71 in 1957 to 20 in 1958.

"The high risks encountered in drilling," President Morgan J. Davis noted in his letter to shareholders, "are evident from the fact that dry hole costs represented about 45 per cent of the total expenditures on drilling."

Mr. Davis went on to say that the continued growth of Humble's natural gas sales and proved reserves was a highly encouraging development. Revenue from gas sales increased by about 23 per cent, principally because of increased volumes and higher average prices. He pointed out, however, that gas operations continued to be handicapped by uncertainty as to the effect of Federal regulations on the prices realized on sales in interstate commerce.

"Fortunately, rapidly increasing local demand for gas promises greater outlets for Humble's production," Mr. Davis said. "Completion of a 30-inch gas line from Southwest Texas to the Houston area this year will place the Company in a good position to supply demands of large industrial customers in the Texas Gulf Coast."

Humble's net production in 1958 averaged 332,200 barrels daily of crude oil and natural gas liquids, the lowest level since 1950. This was 16 per cent under that of the year before, a reduction greater than the industry average because so much of Humble's production is concentrated in Texas and in prorated fields.

Operations of the Baytown refinery and of Humble Pipe Line Company

New benzene plant, placed in service in 1958, added further diversification to Company's expanding petrochemical operations. Long-term outlook for petrochemicals is encouraging.

Most Humble operations below 1957 levels in year characterized by weak demand, large inventories, and excessive imports

were also below the previous year, but both showed a definite recovery in the fourth quarter. The Baytown refinery operated near its rated capacity of 282,000 barrels a day in the last quarter, substantially above the 1958 average of 227,900 barrels daily.

During the year, Humble completed additional facilities at Baytown for the manufacture of petrochemicals, including one of the world's largest benzene plants. A new polyolefin plant to make polypropylene, a high quality plastic, is scheduled for completion in 1959.

Sales of Humble products in Texas and New Mexico continued to increase, and the Company maintained its position as the leading retail marketer of gasoline in Texas.

A cost reduction program started in 1957 was continued throughout 1958. This program embraced economy measures in every department and included a reduction of about 10 per cent in the number of Humble employees. This reduction was achieved largely through normal attrition and by a temporary program of voluntary early retirement. Average compensation and benefits per employee continued to increase. The total payroll, together with other compensation, amounted to $160,953,700.

A number of organization improvements, the president's letter said, were made during the year as a result of careful studies that have been in progress for more than two years. These extensive studies resulted in several desirable changes that will strengthen and simplify the organization and also enable the Company to make more effective use of its personnel. Further improvements should be realized later as a result of the continuing studies.

During the latter part of 1958, Standard Oil Company (New Jersey) offered to exchange five shares of its stock for four shares of stock in Humble. This offer was accepted by a large number of shareholders. Consequently, Standard Oil Company (New Jersey) increased its ownership from about 88 per cent to more than 98 per cent at the end of 1958. This change has not altered the relationship between Humble and its major shareholder.

In his letter to the shareholders, Humble's president said that rising demand for petroleum products should be a favorable factor in 1959, but that the outlook has already been clouded by several developments. Progress made in reducing costs by improved efficiency, Mr. Davis said, has been partially offset by the recent 5 per cent general increase in rates of pay. He also noted that widespread reductions in crude oil prices during the first two months of 1959 make it doubtful that the industry can realize as much per barrel as it did in 1958.

HIGHLIGHTS OF 1958

	1958	1957
FINANCIAL DATA		
Shareholders' Investment	$1,389,926,400	$1,338,096,100
Net Income	$136,543,200	$175,910,400
Dividends	$100,805,100	$96,902,200
Capital Expenditures	$154,925,300	$235,395,400
Per Share:		
Net Income	$1.89	$2.45
Dividends	$1.40	$1.35
OPERATING VOLUMES		
Net Production of Crude Oil and Natural Gas Liquids— Barrels Daily	332,200	394,200
Crude Oil Refined— Barrels Daily	227,900	234,500
Trunk Line Deliveries— Barrels Daily	583,800	675,200
Net Natural Gas Sales— Million Cubic Feet Daily	1,168	1,119

Straining under weight of 30-inch pipe string slung from side booms, a team of powerful tractors struggles to lift line segment into deep ditch cut across flat farmland of Texas coastal plain. Pipe is part of Humble's new King Ranch-Clear Lake natural gas pipeline.

LAYING THE BIG LINE

New 238-mile pipeline will play a major role in Humble's natural gas program in Texas coastal area

AT BOTH ENDS of its 238-mile route, Humble's new pipeline—which will carry natural gas from the King Ranch in Southwest Texas to the Houston area—began to take shape during the last week of March.

Giant ditching machines began gouging out deep trenches. Hooded men with electric torches started welding sections of 30-inch pipe together. And awkward-looking side boom tractors stood by, ready to lift the first lengths of welded, coated pipe into place to be covered.

The contractor, Panama, Inc., has two crews assigned to the project. One crew is moving toward the northeast from the King Ranch Gas Plant site in Kleberg County, laying about two miles of pipe each working day. Simultaneously and at about the same pace, another crew is pushing to the southwest from Humble's Clear Lake Gas Plant near Houston. Sometime in July, if the weather doesn't disrupt their schedule, the two crews will meet near Port Lavaca.

Along the way, the pipeliners will bury some 82,138 tons of pipe. The long tube will stretch across 11 counties, dipping below the beds of nine rivers and tunneling under 312 roads.

When completed, the new line will tie in with Humble's recently completed 78-mile natural gas line connecting Clear Lake with Port Arthur's oil refining and petrochemical plant area.

At the new line's southern terminus, 14 miles southwest of Kingsville, workmen are busy clearing the site so construction can begin on Humble's King Ranch Gas Plant. The contract for the design and construction of the processing and cycling plant was awarded recently to Hudson Engineering Corporation of Houston.

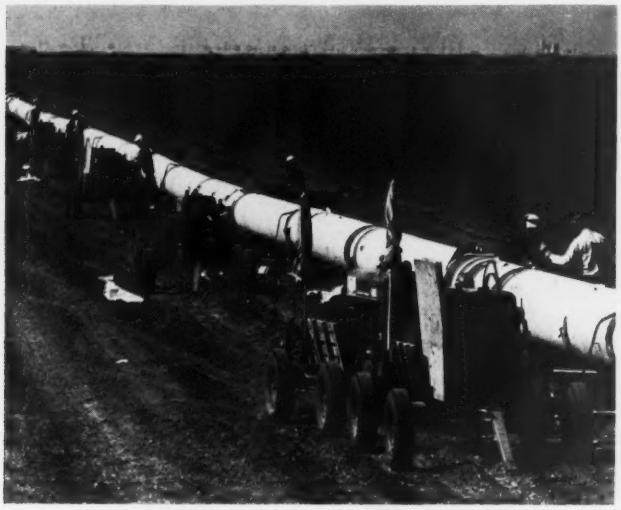
A portion of the plant will be in operation by the end of this year, with the entire facility scheduled for completion sometime in 1960. When completed, it will be capable of recovering 28,000 barrels of liquid products per day while processing 800 million cubic feet of gas daily.

The overall project will cost an estimated $70 million. It includes, in addition to the gas plant and trunk line, a network of gathering lines extending into a number of oil and gas fields in eight Southwest Texas counties.

This natural gas expansion program is designed to help Humble meet the growing demand for gas by large industrial customers in the Texas Gulf Coast area.

Before it is installed, pipe is cleaned, primed, coated, wrapped at plants in Houston, Corpus Christi, Port Lavaca to prevent rust.

Along the right-of-way, line sections are laid in place on ground, linked by stringer bead weld until trailing crew can complete job.



Fusing pipe sections together to make miles-long string, "firing line" of welders finishes joints started earlier by assembly crew.

Scouting ahead with electronic detector, pipeliner makes sure that ditching machine will not hit buried lines in its path.

Ditching machine crawls across coastal plain, its revolving shovels digging about a mile and a half of six-foot-deep trench a day.

Last-minute check of protective coating is made with device called "jeep," consisting of spring around pipe and electronic detector.

Reistle To Head Section of Oil Congress

Carl E. Reistle, Jr., Humble executive vice president and director, will be sponsoring director of the Drilling and Production Section of the Fifth World Petroleum Congress to be held May 30 through June 5 in New York City.

Mr. Reistle is a member of the board of directors of Fifth World Petroleum Congress, Inc., a non-profit corporation formed in 1956 to handle the arrangements and to organize and conduct the congress.

The congress, which held its first session in London in 1933, is dedicated to furthering the study of the science and technology of the petroleum and allied industries on an international scale. It provides facilities for the exchange of information between scientists and technologists of many countries. Some 6,000 of the world's top-ranking oil men, representing more than 45 countries, are expected to attend.

Five Humble scientists and engineers will present technical papers at the congress. W. J. Greenwald of the Petroleum Engineering Division will present a paper titled "Controlled Reservoir Operation—A Case Study." L. S. Wrightman of Humble Pipe Line Company will discuss "Custody Transfer by Displacement Meters."

Representing the Manufacturing Department's Research Division will be Dr. F. W. Lampe, H. W. Earhart, and N. F. Chamberlain. Dr. Lampe's subject will be "Radiation Chemistry of Light Hydrocarbons," Mr. Earhart will discuss "Manufacture and Utilization of Aromatics from Petroleum," Mr. Chamberlain will discuss "Refining Applications of Nuclear Magnetic Resonance Spectrometry."

Safety Awards Given To Employee Groups

Shown above with three of the top safety awards presented to Humble employees recently for 1958 achievements are, left to right, J. U. Parker, R. B. Roaper, A. E. Pecore, R. C. Barbour, W. R. Feather.

Humble employee groups received seven top safety awards recently at the annual Texas Safety Conference in Houston.

The awards, presented by the Texas Safety Association, were made to Humble employees in Texas for outstanding safety achievements both in Company operations and while driving Company vehicles.

Industrial awards were made to employees in the fields of drilling, exploration, and pipe line operations. Fleet awards (safe driving) were in the fields of production, manufacturing, marketing, and pipe line operations.

Awards were based on accident frequency rate during 1958, and only Texas industrial firms entered the competition. Humble competed in the division composed of major firms, those with 500 or more employees or whose employees worked a total of 800,000 or more man-hours during the year.

The Company's over-all industrial accident frequency rate last year was 2.46 disabling injuries per million man-hours worked. The frequency rate of the exploration group was .76. Pipe line employees had a rate of 1.78, and drilling operations, 19.38.

Humble's over-all automobile accident frequency rate was .27 per 100,000 miles driven, the best in Company history. Manufacturing Department employees achieved the lowest rate of Humble drivers, .11. Pipe Line Company employees had the next lowest rate, .24. Production Department was third at .30, and Marketing Department next with .66.

Employees Receive $501,718 For Ideas

Humble employees have received more than half a million dollars in awards for suggestions submitted through the Coin-Your-Ideas plan since that program was initiated in 1931. Some 12,190 separate awards for ideas that improved job methods or equipment have been made through the years, totalling $501,718.

These figures were published in the recent annual report of the Central Coin-Your-Ideas Committee.

The report also stated that employees whose ideas were accepted during 1958 were rewarded with $36,875. Of some 1,914 suggestions submitted, 685 were accepted, and 801 awards were made. Often two or more employees submit a suggestion jointly, and if it is accepted, each gets a separate award. That accounts for the fact that the number of awards is greater than the number of ideas submitted.

Included in last year's total were 761 initial, 36 supplemental, and four capital awards.

Bell Assumes SPE Presidency

John S. Bell

Henry M. Krause

John S. Bell, Humble's California Area manager, assumed office as president of the Society of Petroleum Engineers of AIME recently at the organization's annual meeting.

Mr. Bell is a past chairman of the East Texas Section of SPE, the Production Engineering Committee, and AIME Nominating Committee. He was for three years a member of the Petroleum Branch Executive Committee and the Council of the Pacific Petroleum Chapter.

Another Humble engineer, Henry M. Krause, Jr., Gulf Coast division petroleum engineer, is a director of the Society of Petroleum Engineers.

He has previously served as chairman of the Delta Section, director of the Gulf Coast Chapter, chairman of the General Editorial Committee, and in other capacities.

Temporary Early Retirement Program Announced

A voluntary early retirement program will be offered employees of Humble Oil & Refining Company and Humble Pipe Line Company during the months of May, June, and July.

This temporary program is similar to one instituted during 1958 and is a continuation of cost control measures which were put into effect last year.

Certain retirement allowances apply to eligible employees who are 55 years of age or older with fifteen or more years of service. Women will be eligible at age 50. Under the program, special allowances are being made to replace partially the discount caused by early retirement.

Surplus employees who are terminated and who cannot qualify for retirement will receive a special termination allowance based on length of service.

Two Humble Drivers Win Awards

Two Humble transport truck operators, J. D. Roling and W. K. Blohm, recently were awarded Hobbs Knight of the Road awards for acts of courtesy on Texas highways.

Mr. Roling of Tyler was cited for his assistance at the scene of an accident on Highway 64 southeast of Tyler. He pulled one of the victims out of a truck involved in the collision and directed traffic around the scene of the accident.

Mr. Blohm, a transport driver at the Austin Terminal, was honored for his assistance at the scene of an accident on a highway north of Austin. He also performed meritorious service to the injured.

Butadiene Plant Resumes Full Operation

Humble's entire butadiene plant at Baytown Refinery will be back on stream in early May when the fourth unit "mothballed" last spring is put in operation. Three of the units resumed operation last fall when the market improved. Butadiene is the base stock for synthetic rubber.

The fourth unit will be manned by employees formerly assigned to the butadiene plant who were moved to other units when the plant shut down. They will be offered the opportunity to return in the order of their seniority.

Retirements

HUMBLE PIPE LINE COMPANY

Name	Location	Date of Retirement	Years of Service
Henry C. Dockal	Ingleside Station	April 6	29
William E. Guess	Luling	February 1	36
Irwin Silvey	Anahuac	March 23	33

HOUSTON OFFICE

Elizabeth G. Boyles	Hall Attendants	March 11	23
Royal M. Stephens	Marketing Dept.	March 1	46
Deroma C. Toler	Prod. & Expl. Acctg.	March 7	31

PRODUCTION DEPARTMENT

John C. Andries	Paradis	February 16	34
Leslie K. Breckenridge	Friendswood	March 1	25
Chester O. Burns	London	March 1	33
Roy L. Decker	Gladewater	March 29	35
Arthur P. Emberling	London	March 30	29
Howard E. McGann	McCamey	March 30	29
Fred B. Meyer	Goose Creek	March 7	37
Jesse L. Shaw	East Tex. Div. Office	March 23	32
Troy W. Williamson	Friendswood	April 23	30

LAW DEPARTMENT

David Ball	Houston Office	March 21	25
George T. Gilmer	Eastern Division	March 27	27

BAYTOWN REFINERY

Frank Fields	Machinist Dept.	March 10	22
Carl R. Mann	Distillation Dept.	March 1	30
Ray Myers	Machinist Dept.	March 12	20
Harvey E. Phillips	M & C Division	March 23	31
Virgil R. Reese	Maintenance & Const. Dept.	March 27	39

Deaths

Employees: George M. Fleming, 58, watchman at Goose Creek District, on February 21; Ezra D. Kisling, 62, compressor plant operator and gauger at Goose Creek District, on March 4; Louie J. Lawrence, 59, chief operator at Baytown Refinery, on January 14; Mac Molder, 56, pumper leader at the Specialty Products Manufacturing & Fuel Oil Terminal, on January 19; Bartly C. Shaw, 35, Communication & Electrical maintenance man in Humble Pipe Line Southern Division, on February 22.

Jex J. Turner, 33, compressor plant operator and gauger at Laurel, Mississippi, on March 8; Henry J. Vykukal, 54, senior clerk at Baytown Refinery, on March 11; Joseph V. Zarski, 59, operator C at Baytown Refinery, on March 7.

Annuitants: Raymond C. Allen, 51, former toolpusher at Avery Island, Louisiana, on January 27; Ollen P. Bailey, 70, former handy repairman at Baytown Refinery, on March 20; John H. Brumley, 73, former lease pumper-gauger at Conroe, on January 15; James O. Capeheart, 75, former pumper at Kelsey District, on January 27; Charles R. Cummings, 57, former chief operator at Baytown Refinery, on March 3.

Harry Dillard, 80, former lease pumper-gauger at Thompsons, on January 15; Oliver F. Fuchs, 72, former chief clerk in Marketing Engineering in the Houston Office on March 14; Bert S. Fuller, 83, former telegraph operator-gauger at Crane Station, on January 20; Julius B. Grupe, 66, former Humble Pipe Line division construction foreman at Longview, on January 17.

Gilvie Hubbard, 68, former lawyer in the Law Department in Houston, on January 29; Wayne S. Hughes, 64, former foreman at Baytown Refinery, on January 27; Earl King, 64, former oil dispatcher in Oil Movements in the Houston Office, on January 30.

Albert C. Kunkle, 78, former plumber at London District, on February 18; Andrew S. May, Sr., 64, former separator pumper at Baytown Refinery, Docks, on February 20; Esther P. Milligan, 62, former senior secretary in Manufacturing Operating in the Houston Office, on March 3; Rafael Nieto, 76, former laborer at Baytown Refinery, on February 6.

Clyde H. Olive, 66, former laborer special at Baytown Refinery, on February 8; Pablo Reyna, 70, former laborer special at Baytown Refinery, on March 7; Robert B. Rodgers, 70, former roustabout at Friendswood, on January 24; Lancaster T. Rudolph, 64, former senior account collector in Marketing Accounting in the Houston Office, on January 7; Elmo F. Washington, 65, former lease pumper-gauger at Talco District, on March 7.

By the way

• Lloyd Hawthorne, who painted the woodsy scene on the cover of this issue, lives, appropriately, in the town of Pineville, Louisiana. Many readers will recall that artist Hawthorne's work also appeared in the July-August, 1958, issue of THE HUMBLE WAY in connection with a story on the Gulf Intracoastal Canal.

• One of the most unusual tasks in connection with the laying of Humble's new 30-inch gas pipeline (see pages 24-25) is that performed by the man with the mask and cloth pad pictured below emerging from a section of pipe in the cleaning yard at Corpus Christi. His job is to wipe BBs out of the pipe. And that, no doubt, calls for a bit of explanation.

In cleaning the pipe sections for coating and wrapping, a blast of BB shot is used to remove external rust spots. Some of the tiny pellets find their way into the ends of the pipe. They must be removed before the

pipe is assembled and laid in the trench, because BBs in a pipe line could cause a lot of trouble, maybe even damage a compressor. If the pipe were smaller, the pellets would be removed by an air gun, but on this 30-inch pipe it is more practical to do the job by hand—and knees.

• The San Jacinto battle scene on the centerspread is the work of the well-known Texas artist, E. M. Schiwetz, who needs no introduction to readers of this magazine. In order to paint this picture, Mr. Schiwetz had to take time off from his current project—preparing art and text for a forthcoming book dealing with Texas historical subjects. The book is scheduled to be published next year by the University of Texas Press.

Before starting the San Jacinto painting, artist Schiwetz visited the battleground and retraced the course of the historic engagement. He also studied everything he could find that would give him a clue to the kinds of clothing worn by the Texans. In reconstructing the scene, the artist picked a moment when Sam Houston, still mounted on his white charger, was leading his troops close upon the enemy's position. A few seconds later, the General's horse would be shot out from under him and he himself would lie wounded on the battlefield —an incident not mentioned in his official report.

• If it is true that everybody talks about the weather, not many people in the oil business have as much conversational fodder as the men who worked on the Bear Creek wildcat well (pages 20-21). Besides the rain, snow, and sub-zero cold, there was always the wind, howling across the bleak landscape to clutch angrily at men and equipment. As one man described it, "it's like a hurricane in a frozen food locker."

The native Indians of Alaska also have long had a healthy respect for the rigorous winters in the Bear Creek area. A U. S. Geologic Survey publication in 1911 reported that government geologists had been unable to map the area on a winter expedition because none of the natives would go out with them. In the Indians' book of knowledge, Bear Creek in winter simply was not a fit place for human beings.

The men who drilled the Bear Creek wildcat will not argue that point.

The Humble Way

Vol. XIV No. 6

MARCH-APRIL
1959

Domestic Petroleum Exploration—Achievements and Prospects..... 1
Trees for Tomorrow..... 9
Sam Houston's Report of the Battle of San Jacinto..... 13
Problems Are Their Specialty..... 17
Disappointment at Bear Creek..... 20
1958 Annual Report Reflects Year of Pressures and Problems..... 22
Laying the Big Line..... 24
News Notes..... 26
By the Way..... 28

Published every other month for employees and shareholders

HUMBLE OIL & REFINING COMPANY
P. O. BOX 2180, HOUSTON 1, TEXAS

BOARD OF DIRECTORS

MORGAN J. DAVIS — HERMAN P. PRESSLER
C. E. REISTLE, JR. — RAY H. HORTON
H. W. FERGUSON — ED. J. HAMNER
RALPH J. SCHILTHUIS — NELSON JONES
RICHARD J. GONZALEZ — JAMES H. GALLOWAY

OFFICERS

MORGAN J. DAVIS, *President*
C. E. REISTLE, JR., *Executive Vice President*
H. W. FERGUSON, *Vice President*
RALPH J. SCHILTHUIS, *Vice President*
RICHARD J. GONZALEZ, *Treasurer*
NELSON JONES, *General Counsel*
O. L. LUPER, *Controller*
PAUL MILLSAPPS, *Secretary*

Picture Credits: Inside front cover, Pages 20 and 21 by Anchorage Production District; inside back cover, Pages 10, 11, 12 (except lower left), 17, 18, 19 (except lower right), 22, 24, 25, and 28 by Tom Nowlin; Page 9 courtesy Louisiana Forestry Commission; lower left Page 12 by Will White; lower right Page 19 by Mel Coston; Page 26 by John White.

Art Credits: Cover painting by Lloyd Hawthorne; center spread by E. M. Schiwetz; all other art by Harris Goode & Associates.

Pipe is lifted onto a trailer truck as construction gets underway on Humble's new 238-mile gas pipeline from King Ranch to Clear Lake, near Houston.

Lloyd Hawthorne